

WHAT IS CLAIMED IS:

1. A method for generating a single-sideband optical signal, comprising the steps of:

performing chirpless $0-\pi$ optical phase modulation on carrier wave light in accordance with a required data signal in order to generate a single-sideband optical signal;

passing the generated single-sideband optical signal through an optical filter;

directly detecting the single-sideband optical signal using a photoreceiver;

detecting the magnitude of a residual intensity-modulated component from an output signal of the photoreceiver; and

controlling the center frequency of the optical filter so that the magnitude of the residual intensity-modulated component is always minimized.

2. A method for generating a single-sideband optical signal, comprising the steps of:

performing chirpless $0-\pi$ optical phase modulation on carrier wave light in accordance with a required data signal in order to generate a single-sideband optical signal;

passing the generated single-sideband optical signal through an optical filter;

directly detecting the single-sideband optical signal using a photoreceiver;

detecting the magnitude of a residual intensity-modulated component from an output signal of the photoreceiver; and

controlling the oscillation frequency of the carrier wave light so that the magnitude of the residual intensity-modulated component is always

minimized.

3. A method for generating a single-sideband optical signal, comprising the steps of:

splitting carrier wave light into first carrier wave light and second carrier wave light;

performing chirpless $0-\pi$ optical phase modulation on the first carrier wave light in accordance with a required data signal using a first optical phase modulator in order to generate first phase-modulated light;

generating a bit-delay data signal having a delay corresponding to $\pi/2$ of a bit period of the required data signal inputted;

performing chirpless $0-\pi$ optical phase modulation on the second carrier wave light in accordance with the bit-delay data signal using a second optical phase modulator in order to generate second phase-modulated light; and

combining the first phase-modulated light with the second phase-modulated light so that a phase difference between individual carrier waves thereof is set to 90 degrees in order to generate a single-sideband optical signal.

4. A method according to Claim 3, wherein each of the first and second optical phase modulators comprises a chirpless Mach-Zehnder interferometer-type optical modulator.

5. A method according to Claim 3, wherein,

each of the first and second optical phase modulators comprises a push-pull-driven Mach-Zehnder interferometer-type optical modulator in which electrodes on both arms are driven;

the first optical phase modulator is push-pull driven in accordance with the data signal and the inverted data signal of the data signal in order to perform chirpless $0-\pi$ optical phase modulation in accordance with the required signals; and

the second optical phase modulator is push-pull driven in accordance with the bit-delay data signal and the bit-delay inverted data signal of the bit-delay data signal in order to perform chirpless $0-\pi$ optical phase modulation in accordance with the required signals.

6. A method according to Claim 3, wherein the carrier wave light has the same frequency as the carrier frequency of the generated single-sideband optical signal, is combined with the single-sideband optical signal, and the resultant light is then transmitted.

7. A circuit for generating a single-sideband optical signal, comprising:

a single-sideband optical modulator comprising a first Mach-Zehnder interferometer having second and third Mach-Zehnder interferometers integrated in two arms thereof, the single-sideband optical modulator combining individual output signals of the second and third Mach-Zehnder interferometers to generate a single-sideband optical signal, the output signals being generated by splitting input carrier wave light;

a delay circuit for delaying a data signal supplied to the third Mach-Zehnder interferometer by appropriate bit rate in accordance with a data signal supplied to the second Mach-Zehnder interferometer.

8. A circuit according to Claim 7, wherein the appropriate bit rate is 0.5 bit for the data signal of NRZ.

9. A circuit according to Claim 7, wherein the appropriate bit rate is 0.25 bit for the data signal of RZ.

10. A circuit according to Claim 7, further comprising:

an optical filter, through which the single-sideband optical signal supplied from the single-sideband optical modulator is allowed to pass, for performing band limitation;

an optical splitter for splitting an output of the optical filter;

a photoreceiver for directly detecting one split-off optical signal and then transmitting the optical signal;

a residual intensity-modulated component detector for detecting the magnitude of an intensity-modulated component remaining in the optical signal supplied from the photoreceiver and then outputting the magnitude; and

a controller for controlling the frequency of the input carrier wave light so that the detected magnitude of the residual intensity-modulated component is always minimized.

11. A circuit according to Claim 7, further comprising:

an optical filter, through which the single-sideband optical signal supplied from the single-sideband optical modulator is allowed to pass, for performing band limitation;

an optical splitter for splitting an output of the optical filter;

a photoreceiver for directly detecting one split-off optical signal and then transmitting the optical signal;

a residual intensity-modulated component detector for detecting the magnitude of an intensity-modulated component remaining in the optical signal supplied from the photoreceiver and then outputting the magnitude; and

a controller for controlling the center frequency of the optical filter so that the detected magnitude of the residual intensity-modulated component is always minimized.

12. A circuit according to Claim 7, further comprising:

an optical filter, through which the single-sideband optical signal supplied from the single-sideband optical modulator is allowed to pass, for performing band limitation;

an optical splitter for splitting an output of the optical filter;

a photoreceiver for directly detecting one split-off optical signal and

then transmitting the optical signal;

a residual intensity-modulated component detector for detecting the magnitude of an intensity-modulated component remaining in the optical signal supplied from the photoreceiver and then outputting the magnitude; and

a controller for controlling the center frequency of the optical filter so that the detected magnitude of the residual intensity-modulated component is always minimized, wherein,

the optical filter comprises an asymmetrical Mach-Zehnder interferometer and functions as an optical filter section for controlling the center frequency of the single-sideband optical signal supplied from the single-sideband optical modulator by receiving an electric field on an electrode on one arm; and

the controller controls the electric field applied to the electrode of the optical filter section so that the detected magnitude of the residual intensity-modulated component is always minimized, thereby controlling the center frequency.

13. A circuit according to Claim 7, further comprising:

an optical filter, through which the single-sideband optical signal supplied from the single-sideband optical modulator is allowed to pass, for performing band limitation;

an optical splitter for splitting an output of the optical filter;

a photoreceiver for directly detecting one split-off optical signal and then transmitting the optical signal;

a residual intensity-modulated component detector for detecting the magnitude of an intensity-modulated component remaining in the optical signal supplied from the photoreceiver and then outputting the magnitude;

a controller for controlling the frequency of the input carrier wave light so that the detected magnitude of the residual intensity-modulated

component is always minimized; and

a local oscillation optical path, which serves as an optical guide path splitting the input carrier wave light, having a phase control electrode for applying a phase control bias from the electrode to the split-off carrier wave light to appropriately adjust the optical phase of the carrier wave light and then combine the adjusted carrier wave light with the optical signal transmitted from the optical filter on the output side.

14. A circuit according to Claim 7, further comprising:

an optical filter, through which the single-sideband optical signal supplied from the single-sideband optical modulator is allowed to pass, for performing band limitation;

an optical splitter for splitting an output of the optical filter;

a photoreceiver for directly detecting one split-off optical signal and then transmitting the optical signal;

a residual intensity-modulated component detector for detecting the magnitude of an intensity-modulated component remaining in the optical signal supplied from the photoreceiver and then outputting the magnitude;

a controller for controlling the center frequency of the optical filter so that the detected magnitude of the residual intensity-modulated component is always minimized; and

a local oscillation optical path, which serves as an optical guide path splitting the input carrier wave light, having a phase control electrode for applying a phase control bias from the electrode to the split-off carrier wave light to appropriately adjust the optical phase of the carrier wave light and then combine the adjusted carrier wave light with the optical signal transmitted from the optical filter on the output side.